

Transistors

Medium power Transistor(−32V, −2A)

2SB1188/2SB1182/2SB1240/2SB891F/ 2SB822/2SB1277/2SB911M

●Features

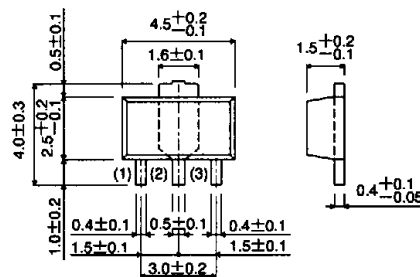
- 1) Low $V_{CE(sat)}$.
 $V_{CE(sat)} = -0.5V$ (Typ.)
($I_C/I_B = -2A/-0.2A$)
- 2) Complements the 2SD1766/
2SD1758/2SD1862/2SD1189F/
2SD1055/2SD19192/SD1227M.

●Structure

Epitaxial planar type
PNP silicon transistor

●External dimensions (Units: mm)

2SB1188

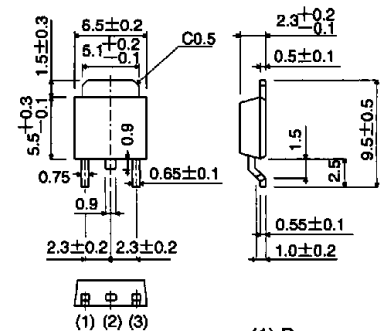


ROHM : MPT3
EIAJ : SC-62

(1) Base
(2) Collector
(3) Emitter

Abbreviated symbol: BC *

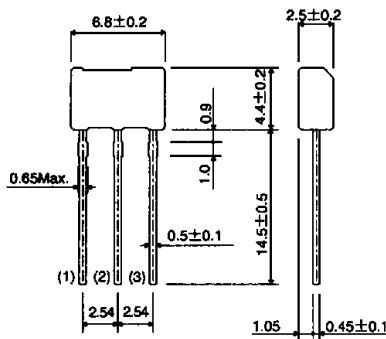
2SB1182



ROHM : CPT3
EIAJ : SC-63

(1) Base
(2) Collector
(3) Emitter

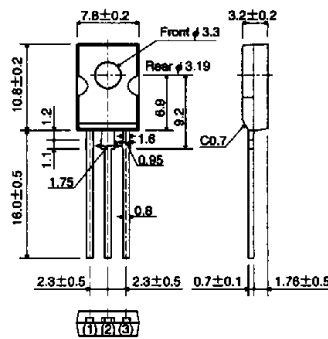
2SB1240



ROHM : ATV

(1) Emitter
(2) Collector
(3) Base

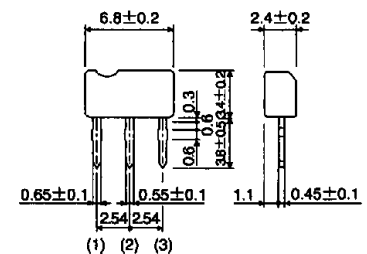
2SB891F



ROHM : TO-126FP

(1) Emitter
(2) Collector
(3) Base

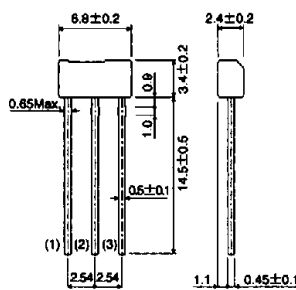
2SB822



ROHM : FTR

(1) Emitter
(2) Collector
(3) Base

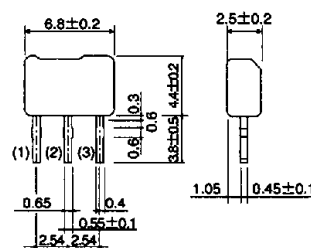
2SB1277



ROHM : FTL

(1) Emitter
(2) Collector
(3) Base

2SB911M



ROHM : ATR
EIAJ : SC-71

(1) Emitter
(2) Collector
(3) Base

*Denotes hfe

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ROHM

(96-131-B24)

Transistors

2SB1188/2SB1182/2SB1240/2SB891F/
2SB822/2SB1277/2SB911M● Absolute maximum ratings ($T_a = 25^\circ\text{C}$)

Parameter		Symbol	Limits	Unit
Collector-base voltage		V_{CB0}	-40	V
Collector-emitter voltage		V_{CE0}	-32	V
Emitter-base voltage		V_{EB0}	-5	V
Collector current		I_c	-2	A (DC)
			-3	A (Pulse) *1
Collector power dissipation	2SB1188	P_c	0.5	W *2
	2SB1182		2	
	2SB1240, 2SB911M		10	W ($T_c = 25^\circ\text{C}$)
	2SB891F		1	W *3
	2SB822, 2SB1277		1.2	
			5	W ($T_c = 25^\circ\text{C}$)
Junction temperature		T_j	150	$^\circ\text{C}$
Storage temperature		T_{stg}	-55~150	$^\circ\text{C}$

*1 Single pulse $P_w = 100\text{ms}$

*2 On 40 x 40 x 0.7 mm ceramic board is used.

*3 Printed circuit board 1.7mm thick, collector copper plating 1cm² or larger.● Electrical characteristics ($T_a = 25^\circ\text{C}$)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Conditions		
Collector-base breakdown voltage		BV_{CBO}	-40	—	—	V	$I_C = -50\text{ }\mu\text{A}$		
Collector-emitter breakdown voltage		BV_{CEO}	-32	—	—	V	$I_C = -1\text{mA}$		
Emitter-base breakdown voltage		BV_{EBO}	-5	—	—	V	$I_E = -50\text{ }\mu\text{A}$		
Collector cutoff current		I_{CBO}	—	—	-1	μA	$V_{CB} = -20\text{V}$		
Emitter cutoff current		I_{EBO}	—	—	-1	μA	$V_{EB} = -4\text{V}$		
Collector-emitter saturation voltage		$V_{CE(sat)}$	—	-0.5	-0.8	V	$I_C/I_B = -2\text{A}/-0.2\text{A}$ *		
DC current transfer ratio	2SB1188,2SB1182	h_{FE}	82	—	390	—	$V_{CE} = -3\text{V}$, $I_C = -0.5\text{A}$ *		
	2SB1240,2SB891F								
	2SB822,2SB1277		120	—	390				
	2SB891F								
Transition frequency		f_T	—	100	—	MHz	$V_{CE} = -5\text{V}$, $I_E = 0.5\text{A}$, $f = 30\text{MHz}$		
Output capacitance		C_{ob}	—	50	—	pF	$V_{CB} = -10\text{V}$, $I_E = 0\text{A}$, $f = 1\text{MHz}$		

* Measured using pulse current.

Transistors

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●Packaging specifications and h_{FE}

Type	h_{FE}	Package	Taping				Bulk	
		Code	T100	TL	TU2	TL2	—	—
		Basic ordering unit (pieces)	1000	2500	2500	2500	1000	2000
2SB1188	PQR		○	—	—	—	—	—
2SB1182	PQR		—	○	—	—	—	—
2SB1240	QR		—	—	○	—	—	—
2SB891F	PQR		—	—	—	—	○	—
2SB822	Q		—	—	—	—	—	○
2SB1277	Q		—	—	—	○	—	—
2SB911M	Q		—	—	—	—	—	○

h_{FE} values are classified as follows :

Item	P	Q	R
h_{FE}	82~180	120~270	180~390

●Electrical characteristic curves

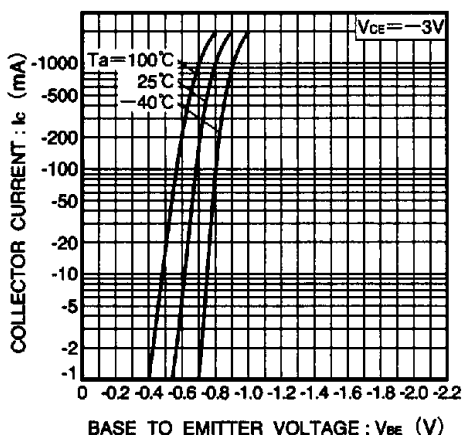


Fig.1 Grounded emitter propagation characteristics

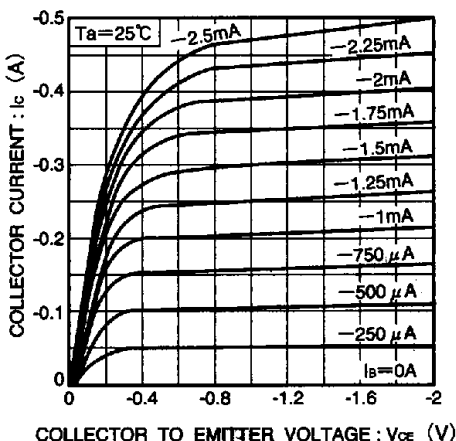


Fig.2 Grounded emitter output characteristics

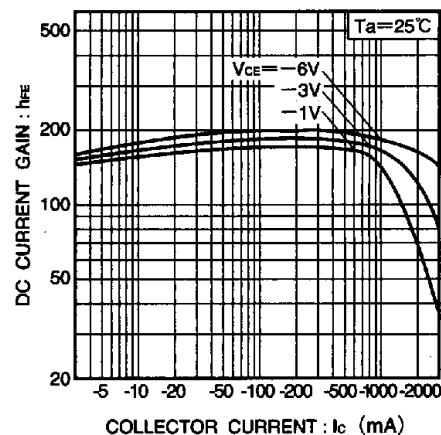


Fig.3 DC current gain vs. collector current (I)

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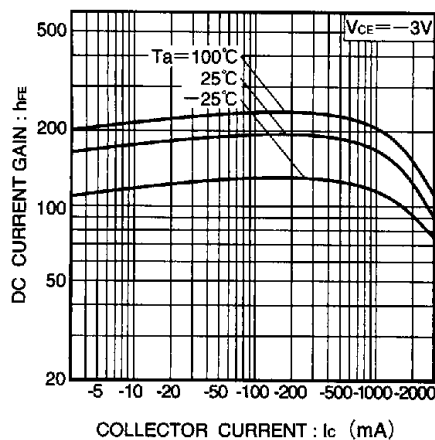
2SB1188/2SB1182/2SB1240/2SB891F/
2SB822/2SB1277/2SB911M

Fig.4 DC current gain vs. collector current (I)

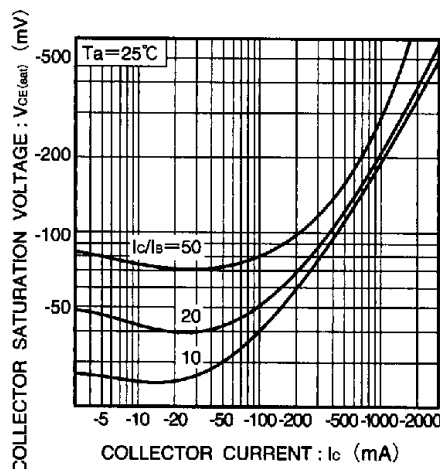


Fig.5 Collector-emitter saturation voltage vs. collector current (I)

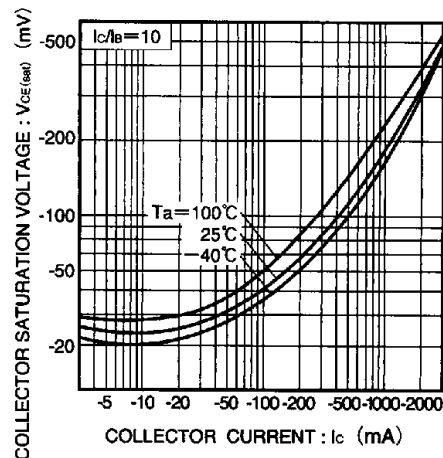


Fig.6 Collector-emitter saturation voltage vs. collector current (II)

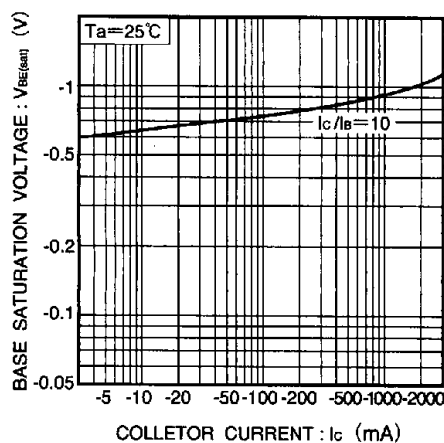


Fig.7 Base-emitter saturation voltage vs. collector current

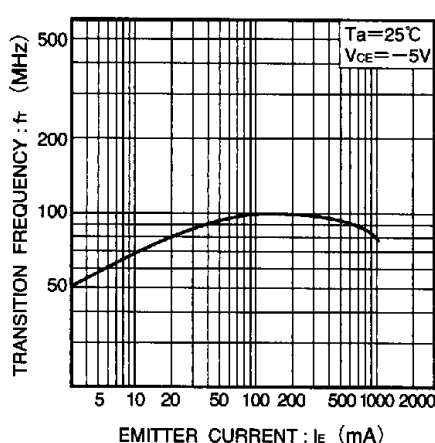


Fig.8 Gain bandwidth product vs. emitter current

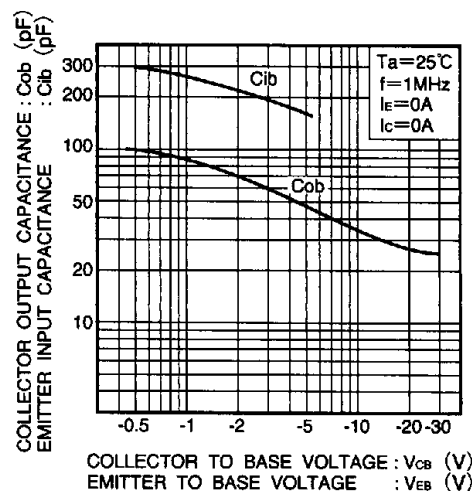
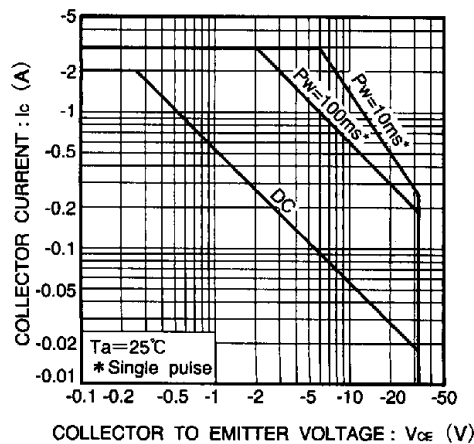
Fig.9 Collector output capacitance vs. collector-base voltage
Emitter input capacitance vs. emitter-base voltage

Fig.10 Safe operation area (2SB1188)

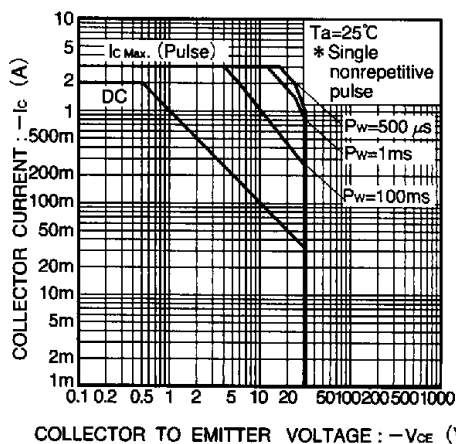


Fig.11 Safe operation area (2SB1182)

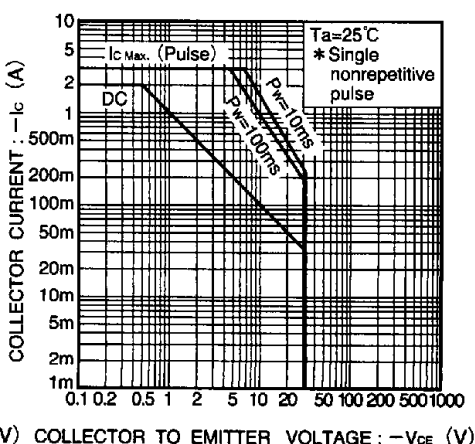


Fig.12 Safe operation area (2SB891)

Bi-polar transistors

Transistors

2SB1188/2SB1182/2SB1240/2SB891F/
2SB822/2SB1277/2SB911M

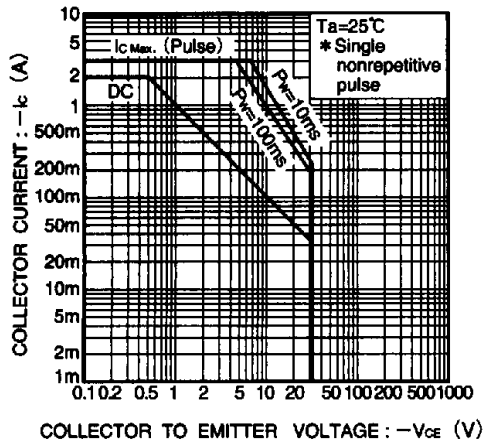


Fig.13 Safe operation area
(2SB891 (TO-126M))

Packages

ROHM has been manufacturing transistors since 1975. In the development of products, we constantly strive to anticipate the needs of our customers. Regarding packages, the demands of the market for compactness, low power consumption, low power dissipation and automatic mounting support are becoming ever greater, and we are strengthening our product development system to meet these needs.

●Types and features of surface-mount packages

Type	External dimensions (Units : mm)	Features
EMT3 SC-75A type		A more compact version of the UMT3 (SC-70), the EMT3 is the world's smallest transistor with a mold size of 1.6×0.8 mm. The mounting area is approximately 60% of the UMT3 and 30% of the SMT3, making it ideal for ultra-high density mounting. Mounting is possible with the same type of automatic mounting machine as the UMT3.
UMT3 SC-70 type		The UMT3 is a smaller version of the SMT3 (SC-59). The mounting area is approximately 60% of the SMT3, making it optimum for high density mounting. The taping size is the same as the SMT3, allowing use of conventional automatic mounting machines. Electrical characteristics and reliability are the same as the SMT3.
SMT3 SC-59 type		The SMT3 is a compact package suitable for small electronic devices and hybrid IC applications. With proven performance, this is one of the most basic small packages. With the exception of P_c (collector power dissipation), electrical characteristics are similar to leaded packages. Reliability is on the same level as the TO-92.
MPT3 SC-62 type		By itself the MPT3 has a P_c of 0.5 W ($T_a = 25^\circ\text{C}$), but when used on a $40 \times 40 \times 0.7$ mm ceramic board, $P_c = 2$ W ($T_c = 25^\circ\text{C}$), allowing high power to be obtained with a small package. The flat package makes it suitable for applications requiring compactness such as hybrid ICs. Available on tape for automatic mounting.

Transistors

Packages

Type	External dimensions (Units : mm)	Features
CPT 3 SC-63 type		By itself the CPT3 has a P_c of 1 W ($T_a = 25^\circ\text{C}$), but a large P_c of several watts can be obtained with an appropriate mounting surface. At the same time the CPT3 is compact, making it suitable for high density mounting and hybrid ICs. Available on tape for automatic mounting. For vertical high density mounting, the leaded CPT (SC-64) type with the same mold size is also available.
PSD3		The PSD3 is a TO-220 class surface-mount package. A high P_c can be obtained with an appropriate mounting surface. Surface mounting allows a high vertical density, enabling the design of slim and compact devices. The PSD3 is available on tape for automatic mounting, and it helps improve mounting efficiency and reduce mounting cost.
SMT5 SC-74A type	All terminals have same dimensions	The SMT5 consists of two connected transistors or digital transistors in an SMT3 (SC-59) package. The mounting area can be reduced by 50% compared to the SMT3 and the internal circuitry is complete, making this package ideal for high density mounting at half the assembly cost.
SMT6 SC-74 type	All terminals have same dimensions	The SMT6 consists of two independent transistors or two independent digital transistors in an SMT3 (SC-59) package. The mounting area and mounting cost can be reduced by 50% compared to the SMT3, and the two transistors are independent to allow free configuration of a high density circuit.

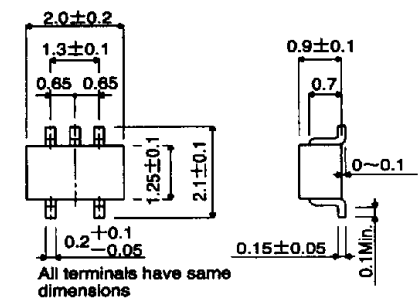
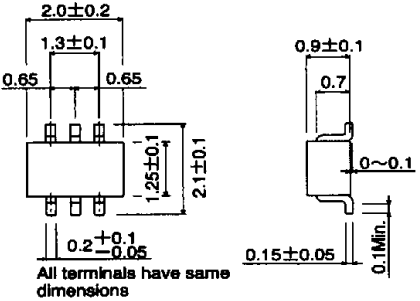
EXPLANATION

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ROHM

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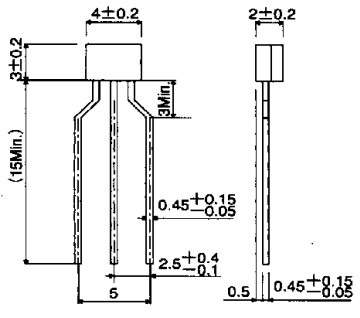
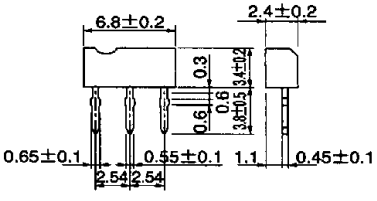
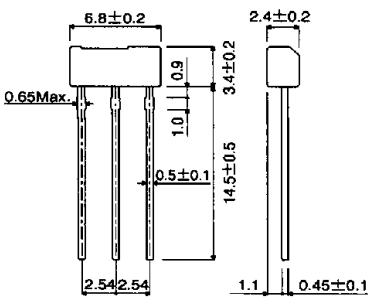
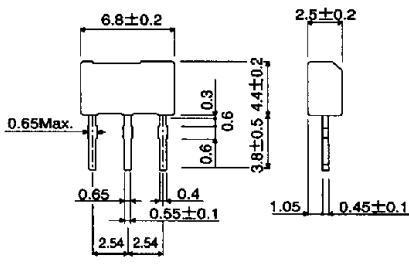
Packages

Type	External dimensions (Units : mm)	Features
UMT5 SC-88A type	 All terminals have same dimensions	The UMT5 consists of two connected transistors or digital transistors in a UMT3 (SC-70) package. The mounting area can be reduced by 50% compared to the UMT3 and the internal circuitry is completed, making this package ideal for high density mounting at half the assembly cost.
UMT6 SC-88 type	 All terminals have same dimensions	The UMT6 consists of two independent transistors or two independent digital transistors in a UMT (SC-70) package. The mounting area and mounting cost can be reduced by 50% compared to the UMT3, and the two transistors are independent to allow free configuration of a high density circuit.

Transistors

Packages

●Types and features of leaded packages

Type	External dimensions (Units : mm)	Features
SPT (SC-72 type)	 Diagram showing the external dimensions of the SPT (SC-72 type) package. The package is a small, rectangular component with a central body and two leads. Dimensions include: body width 4±0.2, body height 3±0.2, lead width 2±0.2, lead height 0.45±0.15, lead pitch 2.5±0.4, and lead length 0.5. A note indicates a minimum length of 15mm for the leads.	The SPT is a smaller version of the conventional TO-92 type. The body size (3×4×2 mm³) has been reduced to 1/4 that of the TO-92 (5×5×4 mm³). The SPT is available on tape for automatic insertion, and less space is occupied on the printed circuit board than the TO-92. Reliability is the same as the TO-92.
FTR	 Diagram showing the external dimensions of the FTR package. The package is a rectangular component with a central body and two leads. Dimensions include: body width 6.8±0.2, body height 0.3, lead width 2.4±0.2, lead height 0.45±0.1, lead pitch 2.54, and lead length 1.1. A note indicates a minimum length of 3.8±0.5 for the leads.	SIL type with a height of 3.4 mm and a lead pitch of 2.54 mm.
FTL	 Diagram showing the external dimensions of the FTL package. The package is a rectangular component with a central body and two leads. Dimensions include: body width 6.8±0.2, body height 0.3, lead width 2.4±0.2, lead height 0.45±0.1, lead pitch 2.54, and lead length 1.1. A note indicates a maximum length of 0.65 for the leads.	The FTL is a radial tapping version of the highly popular FTR. This enables automatic high-density mounting with a radial insertion machine.
ATR (SC-71 type)	 Diagram showing the external dimensions of the ATR (SC-71 type) package. The package is a rectangular component with a central body and two leads. Dimensions include: body width 6.8±0.2, body height 0.3, lead width 2.5±0.2, lead height 0.45±0.1, lead pitch 2.54, and lead length 1.05. A note indicates a maximum length of 0.65 for the leads.	SC-71type with a height of 4.4 mm and a P_c=1W type.

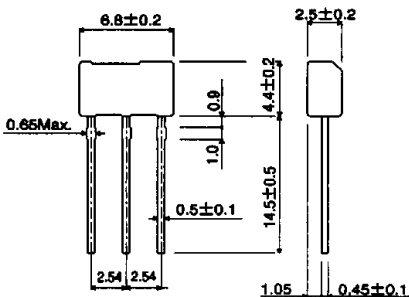
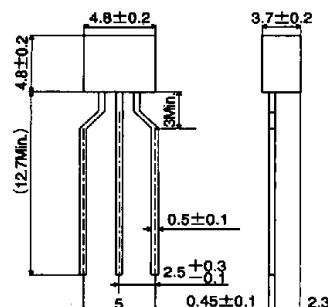
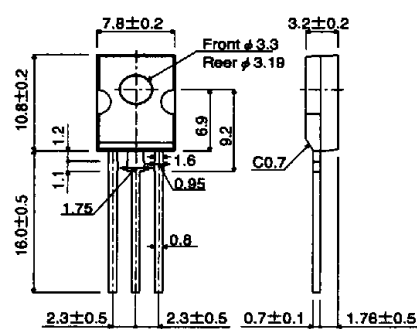
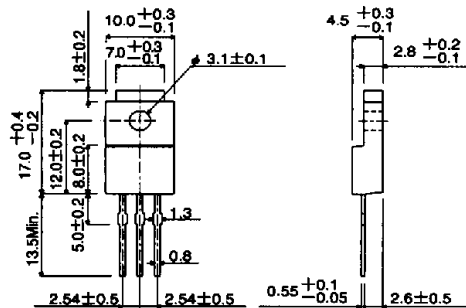
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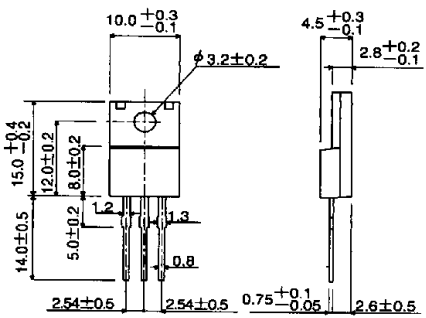
Packages

Type	External dimensions (Units : mm)	Features
ATV	 Diagram showing the external dimensions of the ATV package. Key dimensions include: width 6.8±0.2, height 2.5±0.2, lead spacing 2.54, lead width 0.45±0.1, and total length 14.5±0.5.	The ATV is a radial tapering version of the highly popular ATR. This enables automatic high-density mounting with a radial insertion machine.
TO-92 (SC-43 type)	 Diagram showing the external dimensions of the TO-92 (SC-43 type) package. Key dimensions include: width 4.8±0.2, height 3.7±0.2, lead spacing 2.54, lead width 0.45±0.1, and total length 5.	The SC-43 is for general purpose small signals.
TO-126FP	 Diagram showing the external dimensions of the TO-126FP package. Key dimensions include: width 7.8±0.2, height 10.8±0.2, lead spacing 2.3±0.5, lead width 0.7±0.1, and total length 1.78±0.5. It also specifies front and rear diameters of 3.3 and 3.18 respectively.	The TO-126FP is an isolation type package based on a TO-126 full mold. In addition to the features of the TO-126, molded heat sink fins allow easy isolation of the heat sink.
TO-220FP (SC-67 type)	 Diagram showing the external dimensions of the TO-220FP (SC-67 type) package. Key dimensions include: width 10.0±0.3, height 17.0±0.2, lead spacing 2.54±0.5, lead width 0.55±0.1, and total length 2.6±0.5. It also specifies a lead diameter of 3.1±0.1.	The TO-220FP is an isolation type package based on a TO-220 full mold. In addition to the features of the TO-126 and TO-220, molded heat sink fins allow easy isolation of the heat sink.

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Transistors

Packages

Type	External dimensions (Units : mm)	Features
TO-220FN	 Technical drawing of the TO-220FN transistor package. The drawing includes a top view and a side view. The top view shows a rectangular package with a central circular feature. Dimensions include: overall width 10.0 (+0.3/-0.1), overall height 14.0 (+0.5/-0.2), mounting hole diameter 3.2 (+0.2/-0.2), and various internal dimensions like 12.0 (+0.2/-0.2), 8.0 (+0.2/-0.2), 5.0 (+0.2/-0.2), 1.2, 1.3, 0.8, 2.54 (+0.5/-0.5), 0.75 (+0.1/-0.05), and 2.6 (+0.5/-0.5). The side view shows a package with a maximum height of 4.5 (+0.3/-0.1) and a base thickness of 2.8 (+0.2/-0.1). The package is designed to be 2 mm shorter than the TO-220FP package.	The TO-220FN features the same performance as the TO-220FP with approximately 2 mm less height, allowing the design of slimmer devices. Furthermore, the elimination of support pins in the fin (collector electrode) solves short-circuiting problems with neighboring components and the chassis. To make the height to the installation hole the same as the TO-220FP, it can be replaced as is from the TO-220FP.

EXPLANATION

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